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WHO BENEFITS FROM FOREIGN DIRECT INVESTMENT IN THE UK?

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ABSTRACT

The presumed higher productivity of foreign firms and resulting spillovers to domestic firms has led governments to offer financial incentives to foreign firms. We investigate if there is any productivity or wage gap between foreign and domestic firms in the UK and if the presence of foreign firms in a sector raises the productivity of domestic firms. Our results indicate that foreign firms do have higher productivity than domestic firms and they pay higher wages. We find no aggregate evidence of intra-industry spillovers. However, firms with low productivity relative to the sector average, in low-skill low foreign competition sectors gain less from foreign firms.

I INTRODUCTION

Governments intervene to influence the volume and pattern of foreign direct investment (FDI). Many offer incentives in the form of trade policy concessions, financial assistance and tax breaks. For example, the British Government provided the equivalent of $30 000 per employee to attract Samsung to North East England and $50 000 per employee to attract Siemens to Newcastle (UNCTAD, 1996). A number of justifications for such support have been advanced, including employment creation and regional development. One particularly prominent argument is the alleged productivity gap between foreign owned and indigenous firms and the resulting potential for spillovers. In this paper we investigate whether there is any substance behind the belief that there is a productivity gap (and perhaps associated wage gap) between foreign owned and British firms and whether domestic firms gain from the presence of foreign firms. The UK is an interesting case since it is the second largest host for foreign direct investment, after the US.

The structure of the paper is as follows. Section II explains why we expect a productivity differential to exist and reviews results from other empirical work. Section III describes our data set, and reports evidence on the existence of productivity and wage differentials. Section IV focuses on spillovers, discussing the available evidence and presenting our own results. Section V concludes.

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II Productivity and Wages Differentials

Why do we expect productivity and wage differentials? Theories of foreign direct investment (FDI) agree on at least one major point: foreign firms must have inherent advantages that allow them to overcome the higher costs of becoming a multinational (Hymer, 1976). These firm-specific advantages may be tangible—an improved production process or a product innovation; or intangible—brand names, better management structures or the technical knowledge of employees. The assumption that multinational firms (MNCs) have firm-specific assets implies they may also have higher productivity than domestic firms because of superior technological knowledge, access to international networks and management structure. The assumed higher productivity brings two main benefits to the host. First, it directly introduces new production facilities into the domestic economy (in the case of greenfield sites), or may rescue failing firms in the case of acquisition, potentially raising overall output, employment and exports. Second, domestic governments hope that foreign firms will be unable to internalise their advantages fully, so local firms benefit through spillovers.

In addition to the assumed higher productivity, MNCs are also associated with higher wages. In part this is seen as a reflection of higher productivity—more productive workers have a higher marginal product and are paid higher wages. However, it is also often assumed that workers in foreign firms are paid a premium to attract high quality workers (the adverse-selection version of efficiency wage theory).

Empirical evidence

We will concentrate on the evidence for industrialised countries, which is more relevant to this study. Starting with the UK, most studies seem to find a positive wage and productivity differential, but highlight the potential difficulties in making the comparison and the need to control for some important differences. Aggregate analysis of productivity differences can fail to control for differences in the industrial distribution of foreign and domestic firms (what Davies and Lyons, 1991, term the 'structural effect'). Foreign firms tend to be concentrated in high productivity sectors, a factor that needs to be controlled for to isolate an 'ownership' effect. In addition, foreign firms tend to be larger on average than domestic firms introducing a scale effect. Thus it is necessary to control both for firm size and sectoral distribution when assessing productivity and wage differentials.

Davies and Lyons (1991) implement a decomposition analysis on industry level data. They find that no more than half the productivity advantage of foreign firms can be attributed to structural factors. However, they are limited to labour productivity. Driffield (1996) also finds a significant ownership effect when estimating a wage equation on UK plant data. The wage differential was robust to industrial distribution and to productivity differences, but not to firm size. A more recent study (Driffield, 1999a) found that foreign firms raise wages in the sector although there were no significant effects on productivity. Griffith

(1999) found labour productivity to be higher in foreign firms, but higher levels of capital intensity and higher use of intermediate inputs could explain the differences for the car industry using establishment-level data, with the exception of US affiliates. However, her results do confirm the existence of a wage differential between foreign and domestic firms.

Aitken, Harrison and Lipsey (1996) report similar results for the US: much of the apparent difference in wages is accounted for by greater capital-intensity of foreign firms. Evidence for Canada (Globerman *et al.*, 1994) also points to higher labour productivity but again this can largely be attributed to higher capital intensity and firm size and foreign firms are found to pay higher wages than domestic firms. For the Czech Republic, Djankov and Hoekman (2000) report that total factor productivity is higher in foreign firms and joint ventures than local firms.

To summarise, there appears to be considerable evidence to support a wage differential in favour of foreign owned firms. However, evidence of a productivity differential is more mixed.

III Productivity and Wage Differentials

Database construction and sample characteristics

We use a large firm-level panel data set of almost 4000 domestic and foreign firms in UK manufacturing for the period 1991–96. The choice of sectors and years is dictated by the availability of five-digit level producer price indices we use as deflators.[1] However, the data set is highly disaggregated and there are no reasons for supposing the period is unrepresentative. The primary source of information on firms is the *OneSource* database of private and public companies. Firms are defined as foreign if the country of origin of their ultimate holding company is not the UK.[2]

This data set has a number of attractions. First, it covers a recent period. Second, we use highly disaggregated price deflators (at the five digit SIC 92 level) which allow us to avoid many of the problems associated with more aggregate price deflators. Third, we have been able to match firm-level data with industry variables such as skill mix and import intensity. Finally, the use of a firm-level data set mitigates aggregation biases by allowing us to control for a number of observable and unobservable firm-level characteristics.

We have a number of criteria for selecting our sample. First, to compare similar firms we chose domestic and foreign *subsidiaries* that have not experienced a change of ownership between 1991 and 1996. Subsidiaries are chosen so that both types of firms have parent companies, comparing foreign affiliates to domestic independents could have biased the productivity results

[1] We have price deflators for 175 five-digit sectors with the 1992 Standard Industrial Classification.

[2] In cases where the ultimate holding company is not known, the country of origin of the holding company it used; this applies to less than 10% of the sample.

with foreign affiliates undertaking less headquarter services than independent firms. Parent companies may also have consolidated accounts leading to double counting. In addition, recent work on the impact of acquisition on wages and productivity (Conyon *et al.*, 1999) found that acquisition by a foreign firm leads to higher productivity and wages. We abstract from this by concentrating on affiliates that have not experienced a change in ownership over the period. Second, the resulting firms are screened for data availability on wages, employment, value added and fixed assets; firms are included if they have at least three consecutive years of data. Third, to mitigate the impact of outliers we excluded the top and bottom 5 percentile firms in terms of value added and wages. We also excluded firms with annual wages or value-added growth exceeding 100%, as we have doubts about the reliability of these extreme data points; overall between 15% and 20% of the sample is rejected. Each firm is allocated a sector on the basis of its main line of business. This leaves us with a panel of 2342 domestic and 1408 foreign affiliates.

Summary statistics for the sample are reported in Table 1 and show that overall foreign owned manufacturing firms pay higher wages and enjoy higher productivity. The average annual remuneration and value added per employee in foreign firms was £17 400 and £28 590 respectively, an extra 13·7% and 19·6% relative to the sample means for domestic subsidiaries. In general, foreign firms pay around 6% and produce 11% more than their (four-digit) industry average. Foreign firms also have a higher scale and capital intensity (defined as fixed assets per employee) than domestic firms. This is also the case for growth rates, the growth rates of productivity and wages for foreign firms are 4·6% and 3·1% respectively, while domestic establishments experienced more modest growth of 3·0% and 2·7%.

Evidence from our data set

The basic equation used to analyse productivity and wages differentials can be expressed as:

$$Y_{it} = \delta For_{it} + \beta X_{it} + D_{sic} + D_t + f_i + \varepsilon_{it}. \quad (1)$$

TABLE 1
Sample means (standard deviations)

Variables	Domestic	Foreign
Levels		
Employment	255·24 (400·18)	395·98 (525·64)
Wage rate £'000	15·33 (4·07)	17·44 (4·34)
Output £'000	19 618·56 (48 064)	44 990·7 (80 336)
Productivity £'000	23·91 (10·06)	28·59 (11·96)
Capital intensity £'000	15·55 (16·15)	24·36 (21·50)
Growth rates		
Wages	2·66% (0·09)	3·10% (0·96)
Productivity	2·98% (0·18)	4·57% (0·20)

Where i and t index firms and years respectively, *For* is a foreign ownership dummy, D_{sic} is a five-digit SIC92 dummy for fixed industry effects. D_t are time dummies that account for aggregate shocks, f_i is a time-invariant firm-specific *random* effect and ε denotes a possible heteroscedastic random noise term with unrestricted (within-firm) serial correlation structure. The dependent variable y is the log of labour productivity, value added or wages and X is a vector of control variables. In the labour productivity equation, X consists of *Scale*, which is defined as the firm's output divided by average industry output. In the second equation capital is also included. In the first wage equation scale is included; in the second both scale and labour productivity are included as firm-level controls.

Table 2 shows that there is a 9·97% labour productivity, 5·29% TFP and 9·51% wages differential in favour of foreign firms. The difference between labour productivity and TFP suggests that foreign firms are more capital intensive. Nevertheless, although higher wages and productivity differentials can be partly explained by scale and capital intensity, there are still substantial differences that can be ascribed to foreign ownership. As well as accounting for scale, the estimations control for the sector in which the firm is located through the inclusion of sector fixed effects. The last lines of Table 2 reveal that after controlling for labour productivity in the wage equation a differential of just over 5% in favour of foreign firms still exists.

Foreign firms may pay higher wages as they employ more skilled workers. However, these higher skills should be reflected in higher productivity, and that has been taken account of. Another possibility is that unions are in a better bargaining position to extract rents. However, foreign firms often introduce new bargaining procedures (for instance single union deals) and in addition, the

TABLE 2
Differentials between domestic and foreign firms[3]

	Levels	Growth rates
Labour productivity		
Scale	0·042 (13·47)	0·050 (9·10)
Foreign	**9·97% (9·24)**	**1·48% (5·42)**
Including capital		
Labour	0·794 (89·16)	0·844 (60·81)
Capital	0·145 (24·70)	0·021 (3·38)
Scale	0·057 (11·35)	0·072 (11·22)
Foreign	**5·29% (5·22)**	**1·44% (5·32)**
Wages		
Scale	0·030 (13·57)	0·021 (7·80)
Foreign	**9·51% (13·29)**	**0·40% (2·58)**
Wages (with productivity)		
Scale	0·012 (8·72)	0·010 (4·59)
Productivity	0·418 (54·64)	0·217 (39·23)
Foreign	**5·34% (10·06)**	**0·00% (0·00)**

[3] In this and all subsequent tables, figures in parenthesis indicate asymptotic t statistics.

employer may be in a stronger bargaining position as it can credibly threaten to relocate production abroad (Driffield, 1996). It is possible that foreign firms poach the best workers by paying higher than average wage rates.

Growth differentials between foreign and domestic firms are also analysed by estimating equation (1) in first differences. It can be seen from Table 2 (last column) that labour and total factor productivity growth in foreign firms are higher by about one and a half percentage points compared to domestic firms. However, the wage growth rates are not significantly different once productivity is accounted for. It appears that foreign ownership leads to a level effect, i.e., it is a once and for all rent extraction premium possibly to attract workers.

We have no evidence that convergence in productivity levels is occurring between domestic and foreign firms. Domestic firms would need a higher growth rate than foreign firms to catch up, but instead, foreign firms are experiencing higher growth rates of productivity, indicating that the gap between foreign and domestic productivity is widening. While this is not the case for the wage differential, there is also no evidence of convergence: domestic firms are not experiencing higher wage growth than foreign firms.

Firm nationality

A number of factors can vary by nationality: employment practices; investment vintage; and management techniques. To investigate whether productivity and wage differentials are related to the home country, dummy variables for nationality are included in the earlier estimations for three groups—the US, Japan and 'others' with 525, 76 and 807 firms respectively. Table 3 presents the results.

TABLE 3
Differentials by nationality of ownership

	Levels	Growth rates
Labour productivity		
USA	13·2 (8·43)	1·78 (4·25)
Japan	6·14 (1·55)	1·73 (1·61)
Others	8·45 (6·81)	1·27 (3·97)
Total factor productivity		
USA	8·93 (6·13)	1·71 (4·19)
Japan	−2·99 (0·85)	1·87 (1·76)
Others	3·87 (3·36)	1·22 (3·84)
Wages		
USA	11·39 (10·99)	0·51 (2·39)
Japan	5·24 (2·08)	1·04 (2·21)
Others	8·79 (10·75)	0·22 (1·30)
Wages (with productivity)		
USA	5·87 (7·79)	0·11 (0·61)
Japan	2·67 (1·56)	0·62 (1·49)
Others	5·26 (8·60)	0·00 (0·35)

American firms pay more and are more productive regardless of the measure used. In contrast, the wage differential of Japanese firms is lowest, and disappears when productivity is controlled for. Workers in Japanese firms do not seem to extract rents above their marginal products. However, wages are growing faster in Japanese firms, though this difference also disappears once productivity is controlled for. These results contrast with those for Canada: Globerman *et al*. (1994) found no significant differences in productivity or wage differentials based on nationality of ownership of foreign firms. However, they confirm other results for the UK. Griffith (1999) found that US-owned establishments in the UK car industry have higher total factor productivity than domestic firms. Oulton (1999) also found that productivity was highest in US-owned affiliates. A noteworthy result is that Japanese firms appear to be no more productive than their domestic peers. While the raw data suggest labour productivity of Japanese firms is 9% above their respective four-digit industry average, this appears to be entirely due to scale. A similar pattern can also be noted for productivity growth.[4] Blonigen and Slaughter (1999) also show that Japanese greenfield investment in the US in the 1980s was significantly correlated with lower relative demand for skilled labour. For the UK, Driffield (1996) noted that Japanese plants generally paid below average wages.

IV Productivity and Wages Spillovers

In the previous section we established that foreign firms pay higher wages and enjoy higher productivity than their domestic counterparts. This implies that there is a *composition* effect from FDI—a higher proportion of foreign firms in a sector is likely to raise productivity in that sector. However, we also wish to investigate the dynamic implications of FDI—does the presence of foreign firms raise the productivity of domestic firms in the same sector?

Spillover mechanisms

There are a number of possible mechanisms through which the advantages of foreign firms may be transmitted to domestic firms, based on the diffusion of technology and skills. The mechanisms can be broadly split into two categories—competition and demonstration effects.

Competition effects occur as the entry of MNC affiliates forces local firms to take action to protect market share. Spillovers can occur if the entry of an affiliate leads to more competition in the host economy so that domestic firms use technology and resources more efficiently (Blomström and Kokko, 1997). *Demonstration effects* occur when local firms improve productivity by copying MNC affiliates. This relies on the foreign firm being unable to effectively

[4] One possible explanation for the substantial public subventions deployed in attracting Japanese firms is that they often locate in regions with high unemployment such as the North East of England and Wales. To test this we included average regional wage in the sector to see if there was a local 'Japanese effect'. The results showed no evidence for this and are not presented here.

appropriate all the benefits of innovations and in-firm knowledge. These effects may occur through direct links with domestic firms—either as suppliers or consumers—or a more arms-length effect. An additional mechanism for demonstration effects is through training. Foreign firms may train workers without charging them the full price of the training, and the workers may subsequently move to domestic firms.

These suggest a positive impact of foreign firms on domestic productivity. However, a number of different effects on wages are possible. Foreign firms entering the domestic market could raise wages, have no impact, or lower wages paid by domestic firms. A positive impact could result if there is a shift in labour demand in the industry with domestic firms having to raise wages to attract the best workers, or if domestic firms invest more in training their staff as a result of foreign competition. Alternatively, if foreign firms were simply acquiring domestic firms that are already in high wage sectors, then the foreign presence would have no impact on domestic wages. A high foreign presence could have a negative impact if foreign firms poach the best workers from domestic firms, leaving them with low wage employees.

Empirical evidence

A number of surveys of spillover effects exist (e.g., Blomström and Kokko, 1997). Early evidence for Australia (Caves, 1974) and Canada (Globerman, 1979) at the industry level indicated that the level of foreign presence was significant in positively influencing domestic productivity. More recent studies for the UK also using industry-level data find positive spillover effects (Hubert and Pain, 1999). The latter find these to be largest in manufacturing but with some positive effects also in private service sectors. However, using industry data has a number of limitations. For instance, it is difficult to distinguish between the composition effect of higher foreign productivity and spillovers to domestic firms, and to control for firm scale effects and general firm heterogeneity. Cantwell (1989) concentrated on market shares rather than productivity, and found that US firms did not always have a positive impact. He concluded that the competitive effect only had a positive impact on domestic market shares where domestic firms already had some technological capabilities.

As far as wages are concerned, Driffield (1996) in a plant-level study for the UK, found evidence that a high foreign presence in a sector caused wages to rise for domestic firms, even allowing for the composition effect.[5] This was not the case for all foreign investment as some (e.g., Japanese firms) was associated with paying below-average wages. Driffield (1999a) has also found that foreign firms lead to wage increases within the sector, causing domestic firms to reduce employment. Evidence for the US (Aitken *et al*., 1996) suggests that a larger share of foreign ownership in a sector, based on employment, is associated with higher wages for domestic firms, as well as higher average wages, i.e., a spillover

[5] Driffield (1999b) finds small local spillovers, local in the sense of both region and sector in the UK.

as well as a composition effect. This contrasts with results for Mexico and Venezuela, where no evidence of spillovers is found. Figlio and Blonigen (1998) support this, finding that a rise in foreign employment in a sector has a large positive effect on county wages. However, this may not be due to increased demand for skilled labour. Blonigen and Slaughter (1999) find that inward FDI in the US has not led to skill upgrading. Evidence for the Czech republic (Djankov and Hoekman, 2000) indicates that a foreign presence can have a negative effect on domestic firms that have no foreign partner. There appears to be a positive composition effect but this is not passed on to other domestic firms.

To summarise, evidence on spillovers from foreign investment in industrialised countries is mixed. One reason is the difficulty in finding an adequate testing procedure, another is related to measuring and observing spillovers. There seems to be some indication that foreign ownership may increase wages for other firms in the sector but less evidence for widespread productivity improvements for domestic firms.

Intra-industry spillovers

We estimate possible wage and productivity spillovers by replacing the foreign ownership dummy in equation (1) with a measure of foreign presence in the sector s (FDI):

$$y_{it} = \delta FDI_{st} + \beta X_{it} + D_{sic} + D_i + f_i + \varepsilon_{it}. \tag{2}$$

The regressions are run on data for domestic firms alone. Since industry fixed effects are included, we are only exploiting within-sector variations. If the regressions were run without industry dummies, we would also have been able to exploit between sector FDI variations. However, with that modelling framework a positive coefficient on FDI can simply reflect the fact that foreign firms invest in industries that pay higher wages and enjoy higher productivity rather than the existence of any genuine spillovers, i.e., there is a sector selection problem.

The estimation results reported in Table 4, show that, *on average*, there are no wage and productivity spillovers to domestic firms as a result of foreign presence, measured as the sector share of foreign employment.[6] We also tested the impact of foreign presence on productivity and wage *growth* by estimating:

$$\Delta y_{it} = \delta \Delta FDI_{it} + \beta \Delta X_{it} + D_t + \Delta \varepsilon_{it}. \tag{3}$$

But we found no substantial evidence linking productivity and wages growth with growth of FDI, after accounting for domestic firms' scale of production growth.

The determinants of intra-industry spillovers

The apparent absence of any link between FDI and domestic firms' wages and productivity could be due to insufficient within-sector variation in FDI, which is

[6] Defining FDI in terms of output yields qualitatively similar results.

TABLE 4
The impact of FDI on the productivity and wages of domestic firms

	Share of Foreign			
	Employment		Output	
	Level	Growth	Level	Growth
Labour productivity				
Scale	0·051 (8·43)	0·057 (5·94)	0·051 (8·43)	0·056 (5·94)
FDI	**0·018 (0·31)**	**−0·021 (0·47)**	**−0·026 (0·44)**	**−0·028 (0·80)**
Total factor productivity				
Labour	0·796 (66·11)	0·818 (48·07)	0·796 (66·12)	0·827 (48·14)
Capital	0·151 (21·06)	0·034 (4·21)	0·151 (21·06)	0·025 (3·75)
Scale	0·063 (6·51)	0·081 (6·54)	0·063 (6·51)	0·075 (10·69)
FDI	**0·003 (0·05)**	**−0·048 (1·06)**	**−0·030 (0·52)**	0·052 (1·88)
Wages				
Scale	0·033 (8·68)	0·021 (4·78)	0·033 (8·68)	0·021 (4·79)
FDI	**0·028 (0·77)**	**−0·048 (2·16)**	**0·036 (1·02)**	**−0·021 (1·06)**
Wages with productivity				
Scale	0·011 (5·47)	0·010 (2·24)	0·011 (5·47)	0·010 (2·25)
Productivity	0·449 (45·17)	0·247 (32·50)	0·449 (45·12)	0·247 (32·50)
FDI	**0·019 (0·65)**	**−0·043 (2·17)**	**0·048 (1·64)**	**−0·014 (0·77)**

less than 9% of the total variation in our data. Moreover, wages and productivity spillovers as a result of FDI are assumed to be the same across sectors and firms. From an econometric point of view, we still get an unbiased estimate of the average FDI externality even if spillover effects are heterogeneous across firms; but the average value can mask the true picture of what is really going on. An alternative strategy is to assume that the level of spillover varies according to industrial and firm level characteristics. Modelling FDI response heterogeneity can yield valuable insights into the mechanisms leading to spillovers. Blomström, Globerman and Kokko (1999) review the literature on which factors influence spillovers and conclude that competition and the technical capability of local firms increase the likelihood of positive spillovers. Conversely, a large gap between domestic and foreign firms lowers the possibility of spillovers. In contrast, Wang and Blomström (1992) develop a model in which spillovers result from strategic interaction. They find that the degree of spillovers is proportional to the level of host country firms' learning investment. But they also establish that, irrespective of this, there exists some spillover that is positively related to the size of the technology gap between foreign and domestic firms or the latter's market share (i.e., contagion effects). The larger the gap between the firms, the larger the spillover.

We statistically test the importance of different characteristics in influencing spillovers, including the two competing hypotheses on the role of the technology gap. We select the characteristics that may be important from Blomström *et al.* (1999)—the level of competition and skill in the sector, and the technology gap

between the firm and the sector. That is we re-estimate the spillover equations by postulating that: $\delta = f$ (skill, competition, technology gap).

The technology gap is measured by the individual firm's total factor productivity gap relative to the 90th percentile TFP of the corresponding 2-digit SIC92 industry, in the previous year. The level of competition is measured by the 4-digit SIC92 import penetration index and skill is defined as the ratio of skilled to unskilled employment within the 3-digit SIC92 industry (see the Appendix for details).

Estimation results

An examination of Table 5 yields some interesting results. With higher levels of import competition and skills in the sector, the impact of FDI on the productivity of domestic firms increases. On the other hand, we find evidence that firms with a low initial productivity level have a slower productivity spillover rate. This confirms the general consensus on the role of the technology gap and competition in influencing spillovers (Blomström *et al.*, 1999). It is noteworthy that the effect of FDI on labour and total factor productivity is virtually the same. This prompts the conclusion that the effect of foreign presence on capital productivity is negligible.

Wage spillovers follow similar patterns, except that the skill level has no significant effect. However, when productivity is controlled for in the wage equation, the FDI spillover does not depend on the extent of the firm's technological gap or the sector's import penetration, but higher skill intensity appears to dampen the domestic wage effect of FDI. Apparently less skilled

Table 5
The determinants of spillover effects

	Level	Growth
Labour productivity		
Skill	0·371 (3·72)	0·264 (3·88)
Productivity gap	−2·800 (29·42)	−0·916 (4·42)
Imports penetration	0·759 (3·85)	0·115 (0·72)
Total factor productivity		
Skill	0·374 (3·90)	0·276 (4·10)
Productivity gap	−2·770 (30·98)	−0·920 (4·52)
Imports penetration	0·693 (3·52)	0·066 (0·41)
Wages		
Skill	0·072 (1·26)	0·010 (0·29)
Productivity gap	−1·235 (16·30)	−0·267 (2·89)
Imports penetration	0·460 (3·86)	0·033 (0·40)
Wages with productivity		
Skill	−0·098 (2·27)	−0·053 (1·63)
Productivity gap	0·051 (0·87)	−0·045 (0·52)
Imports penetration	0·111 (1·53)	0·005 (0·07)

domestic workers have more success at extracting rents (over and above their marginal product) as the sector's FDI share increases. Another interpretation is that when the skill level is low, domestic firms have to raise the wages of the skilled workers to prevent them from being poached.

Unfortunately we do not have detailed enough data to discriminate between these two competing hypotheses. The productivity and wage growth equation reveal that the impact of FDI growth is inversely related to the productivity gap, while import competition and skill have no significant impact. The overall impact of FDI on wages disappears when domestic workers' productivity level is accounted for. Any positive effects can therefore be interpreted as due to domestic firms becoming more efficient as a result of foreign competition, rather than a shift in labour demand in the industry where domestic firms have to raise wages to attract the best workers.[7]

To clarify the results we estimate the marginal effects at different levels of competition and technology gaps. In Table 6 we report FDI impact parameters for labour productivity and wages without the productivity term.[8] With a 10% increase in the sector's foreign presence, the productivity spillover is positive and significant for all firms with a low technological gap. A maximum productivity increase of 4·8% is observed in high skill and high import intensity sectors. When the technology gap is set at 25% the productivity of domestic firms operating in the same sector seems to deteriorate as a result of increased foreign presence, although this disappears as competitiveness increases.

Table 6
The impact of FDI on domestic firms

	Labour productivity		Wages	
	Low skill	High skill	Low skill	High skill
		33% import penetration		
10% Gap	0·094 (1·72)	0·217 (3·38)	0·052 (1·54)	0·076 (1·96)
15% Gap	−0·046 (0·87)	0·077 (1·24)	−0·009 (0·28)	0·015 (0·38)
25% Gap	−0·326 (6·19)	−0·203 (3·32)	−0·133 (3·82)	−0·109 (2·86)
		50% import penetration		
10% Gap	0·223 (2·61)	0·346 (4·04)	0·130 (2·48)	0·155 (2·92)
15% Gap	0·083 (0·98)	0·206 (2·44)	0·069 (1·31)	0·093 (1·78)
25% Gap	−0·198 (2·39)	−0·074 (0·90)	−0·055 (1·04)	−0·031 (0·60)
		66% import penetration		
10% Gap	0·352 (3·00)	0·475 (4·19)	0·209 (2·89)	0·233 (3·32)
15% Gap	0·212 (1·82)	0·335 (2·99)	0·147 (2·04)	0·171 (2·46)
25% Gap	−0·069 (0·00)	0·055 (0·50)	0·023 (0·32)	0·047 (0·49)

[7] Greenaway, Hine and Wright (1999) (2000) report similar pro-competitive effects of import competition on wages and employment in the UK.

[8] Low (high) skill is defined as the case where the skilled/unskilled ratio in the sector is one to two (two to one). The asymptotic *t*-ratios are calculated by taking into account the covariance between the various components of δ.

Wages follow similar patterns, although not all productivity changes are transmitted into wage gains (or losses). For example the (maximum) productivity spillover of 4·8% is accompanied by a wage increase of 2·3%. In this (typical) case, the FDI effect on wages is about 48% of the effect on productivity. Noting that the quasi-rent splitting parameter in the wage equation of Table 4 is about 45%, it is not surprising we see no wage spillovers when productivity differences are taken into account.

V Conclusions

Many governments provide subventions to attract inward investment. There may be a number of motivations for this including raising productivity, increasing employment and regional policy. Foreign firms may raise productivity in two main ways: through their own higher productivity and through raising the productivity of domestic firms. We have examined both. We began by testing whether or not a productivity differential existed between foreign and domestic firms and any associated wage differential, we then investigated whether an increase in foreign presence affected productivity levels and growth and wage levels and growth of domestic firms.

Using a panel for the UK for the first half of the 1990s, we find that labour productivity in foreign firms is almost 10% higher than in domestic firms whilst total factor productivity is greater by around 5%. As one would anticipate, there is an associated wage differential, but even after we allow for productivity differences we still find that foreign firms pay on average 5% more than domestic firms. We found American firms to have the largest differential and Japanese the smallest. This confirms the first of the alleged productivity benefits from foreign firms—a large number of foreign firms will raise aggregate productivity through a composition effect.

When we tested for intra-industry spillovers, we found that on average there were no wage and productivity spillovers to domestic firms as a result of foreign presence, whether in levels or growth. We investigated this further by introducing factors that could influence the capacity of domestic firms to benefit—skill mix in the workforce, competitiveness of the market and any initial productivity gap. In aggregate, domestic firms are not gaining from the presence of foreign firms—some are experiencing positive effects, others negative, but overall these are cancelling each other out.

So who does benefit from foreign direct investment in the UK? The benefits can be split into direct and indirect effects. The main direct gain is by workers in foreign-owned firms who receive higher wages. Firms with low technology gaps relative to the technological leaders can indirectly benefit from the presence of foreign firms regardless of other characteristics of the sector. This will also be passed on to workers in higher wages. Firms located in sectors characterised by high levels of skills and a high degree of international competition (even if they have a larger technology gap) can also gain from FDI. The other side of the coin is that firms with large technology gaps, in sectors with low skill levels and low levels of foreign competition, may be damaged by the presence of foreign firms.

Financial support for foreign firms based on the assumption of universal spillover effects may therefore be misguided.

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DATA APPENDIX

Employment: Average number of employees during the year (full and part-time).
Wages: Average remuneration in a year excluding tax, social security and pension payments.
Value added: Turnover less the cost of bought-in materials and sources.
Fixed assets: Tangible fixed assets at their net book values.
Scale: firms output divided average 4-digit level output (OneSource)
Producer Price Indices: 5-digit SIC92 indices from The Business Monitor MM 22.
Import intensity: Basic data from OECD's International Trade by Commodities Statistics. Aggregation to 4-digit SIC92 level using the official concordance obtained from the ONS.
FDI: Estimated by the 4-digit SIC92 sector's foreign share of manufacturing employment or output, from the population of subsidiaries in OneSource.
Proportion of skilled workers: 3-digit SIC92 data for 1993–95 from the Census of Production.

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